



LANGER
EMV-Technik



User manual

EMC-Basic 1 set
Demonstration Boards
Mini Burst Field Generators

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1. Declaration of Conformity

Manufacturer:

Langer EMV-Technik GmbH
Nöthnitzer Hang 31
01728 Bannewitz
GERMANY



Langer EMV-Technik GmbH hereby affirms, that the product specified below

EMC Basic 1 set

Demonstration Boards Mini Burst Field Generators

Agrees with the regulations of EC guidelines:

- Low Voltage Directive 2014/35/EU
- EMC Directive 2014/30/EU
- Restriction of certain Hazardous Substances 2011/65/EU and EU 2015/863

Applied standards and technical specifications:

- DIN EN 61010-1:2020-03 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1
- DIN EN IEC 61000-6-1:2019-11 EMC - Immunity
- DIN EN 61000-6-3:2011-09 EMC - Emission

Person authorized to compile the technical file:

Gunter Langer

Bannewitz, 2022-01-12

G. Langer, General Manager

2. General Information

2.1 Storing the User Manual

This user manual provides the basis for the safe and efficient use of the EMC-Basic 1 set. It must be kept handy and easily accessible for the user.

2.2 Reading and Understanding the User Manual

Read and understand the manual and observe the instructions carefully before using the EMC- Basic 1 set. Please consult Langer EMV-Technik GmbH if you have any questions or comments.

The user manual must be kept readily available in the immediate vicinity of the product.

2.3 Local Safety and Accident Prevention Regulations

The applicable local general safety and accident prevention regulations must be adhered to.

2.4 Images

Images in this manual facilitate a better understanding, but can deviate from the actual execution.

2.5 Limitations of Liability

The Langer EMV-Technik GmbH is not liable for personal injury or damage to material, if

- the instructions in this user manual were not followed.
- the product was used by personnel who are not qualified in the field of EMC and who are not fit to work under the influence of disturbance voltages and electric and magnetic fields.
- the EMC-Basic 1 set was not used as intended.
- the EMC-Basic 1 set was arbitrarily modified or technically altered.
- spare parts or accessories were used, that were not authorized by Langer EMV-Technik GmbH.

2.6 Errors and Omissions

The information in this user manual has been checked very carefully and found to be correct to the best of our knowledge; however, Langer EMV-Technik GmbH can assume no responsibility for spelling, typographical or proofreading errors.

2.7 Copyright

The content of this user manual is protected by copyright and may only be used in connection with the EMC-Basic 1 set. This user manual may not be used for other purposes without the prior consent of Langer EMV-Technik GmbH.

3. Scope of Delivery

SF 11 – Demo Board Immunity B-Field

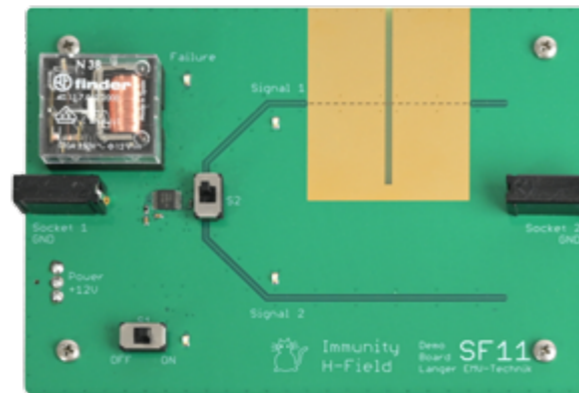
Short Description

The SF 11 demo board is a board on which interference effects such as burst and ESD due to magnetic field are demonstrated.

The interference can be generated e.g. with burst generators, ESD generators, the E1 Immunity development system and field sources from Langer EMV-Technik GmbH and thus illustrate their operating principle.

Technical Parameters

Supply voltage	12 V
Current input	ca. 20 mA
Sizes (L x W x H)	(140 x 100 x 23) mm



SF 21 – Demo Board Immunity E-Field

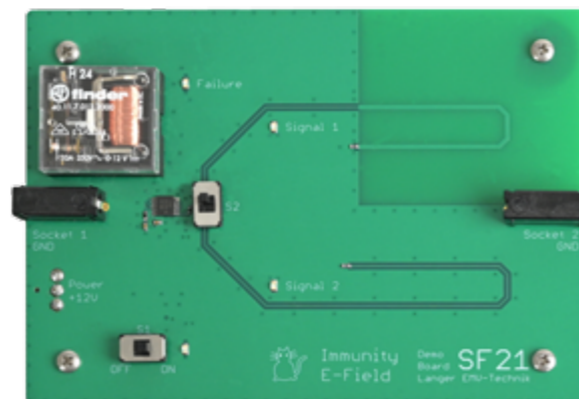
Short Description

The SF 21 demo board is a board on which interference effects such as burst and ESD due to E-field are demonstrated.

The interference can be generated e.g. with burst generators, ESD generators, the E1 Immunity development system and field sources from Langer EMV-Technik GmbH and thus illustrate their operating principle.

Technical Parameters

Supply voltage	12 V
Current input	ca. 20 mA
Sizes (L x W x H)	(140 x 100 x 23) mm



NT FRI EU – Power Supply Unit

Technical Parameters

Output voltage	12 V
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P11 – Mini Burst Field Generator (B)

Short Description

The P11 mini burst field generator creates a magnetic disturbance field with a diameter of approx. 3 mm at its tip. Localized pulses can be transmitted via this field onto the surface of printed circuit boards and components allowing for weak points such as the sensitive parts of conducting paths, components and component connectors to be detected.

Technical Parameters

Generated magnetic flux density	ca. 1 mT
Pulse parameter	
Pulse width	2 ns ... 8 ns
Frequency	single / 5 kHz
Polarity	switchable
Supply voltage	1.5 V / AAA
Weight	30 g
Sizes (L x W x H)	(118 x 24 x 13) mm



P21 – Mini Burst Field Generator (E)

Short Description

The P21 mini burst field generator creates an electric field at its tip, which is suitable for coupling into conducting paths, wires, pins, and components, especially SMD components like resistors and capacitors. Single conductors of flat cables or plug contacts can be also tested.

Technical Parameters

Generated E-field strength	ca. 100 kV/m
Pulse parameter	
Rise time	1.8 ns ... 10 ns
Frequency	single / 5 kHz
Polarity	switchable
Supply voltage	1.5 V / AAA
Weight	30 g
Sizes (L x W x H)	(118 x 24 x 13) mm



4. Safety

4.1 Intended Use

The EMC-Basic 1 set contains modules for demonstrating immunity and emission phenomena.

The EMC-Basic 1 set is powered by the supplied power supply.

4.2 Reasonably Foreseeable Misapplication

Incorrect application of the EMC-Basic 1 set may result in danger to the user, damage to the product and/or connected devices.

Examples of incorrect applications that can lead to danger:

- Safety devices are bypassed or disabled.
- The devices are not in a proper technical condition during operation.
- The EMC-Basic 1 set is not operated within the specified technical parameters.
- The scope of application is changed by modifying the design.

There are no claims due to misuse of the EMC-Basic 1 set!

4.3 Personnel Requirements

Only qualified personnel with knowledge and experience in the field of EMC are allowed to operate the EMC-Basic 1 set.

4.4 Safety Instructions

If you use a Langer EMV-Technik GmbH product, please observe the following safety instructions to protect yourself against electric shock or the risk of injury.

- Before each start-up, all connected devices must be checked externally for damage.
- The EMC-Basic 1 set may only be operated under supervision.
- Damaged or defective devices must not be used.
- The operating and safety instructions for all devices included in the measurement set-up must be observed.

5. Test Procedure

5.1 SF 11 - Demo Board B-Field Immunity

During immunity tests, interference pulses are often fed into the devices or assemblies to be tested via cables. This results in interference currents within the assemblies, which are always associated with magnetic fields (Fig. 1). Depending on the layout of the assembly, these fields can induce voltages in signal conductor loops and thus generate functional errors.

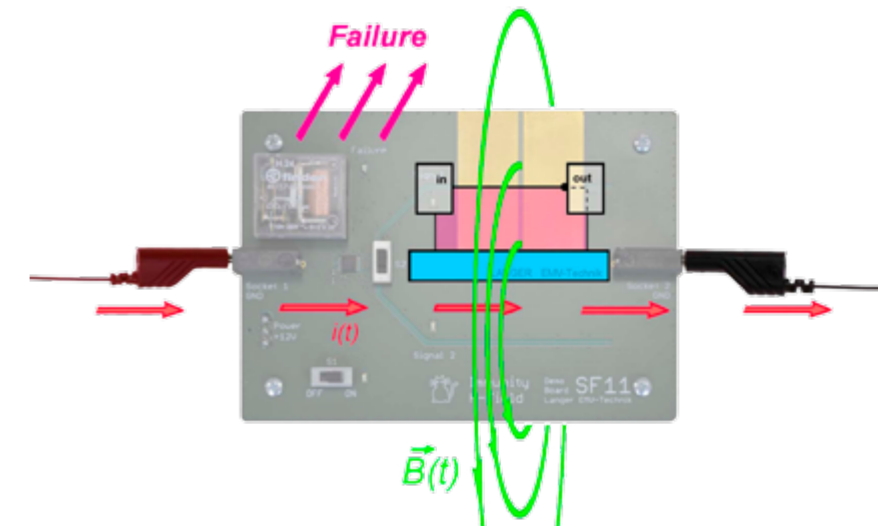


Figure 1: SF11 with interference current and magnetic field with two cables connected

In order to find the causes of functional errors, it is important to determine where sensitive signal conductor loops are located on the module. The P11 pulser is used for this purpose.

It generates a small-scale magnetic field at its tip. This is used to simulate the magnetic field generated during an immunity test according to the standard in a very small area. To do this, the switched-on pulser is moved by hand over the assembly (Fig. 2). If there is a sensitive signal conductor loop below the pulser tip, the DUT generates the same functional fault as in the immunity test according to the standard.

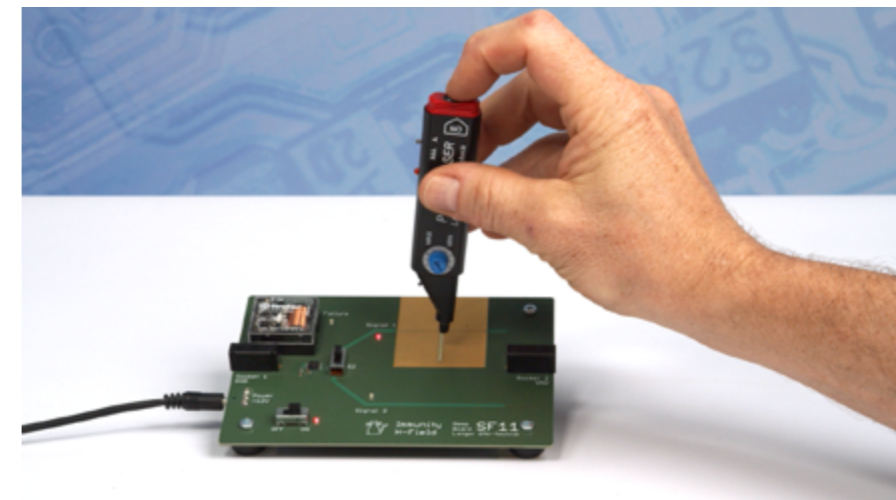


Figure 2: P11 pulser is guided over the SF11 demo board

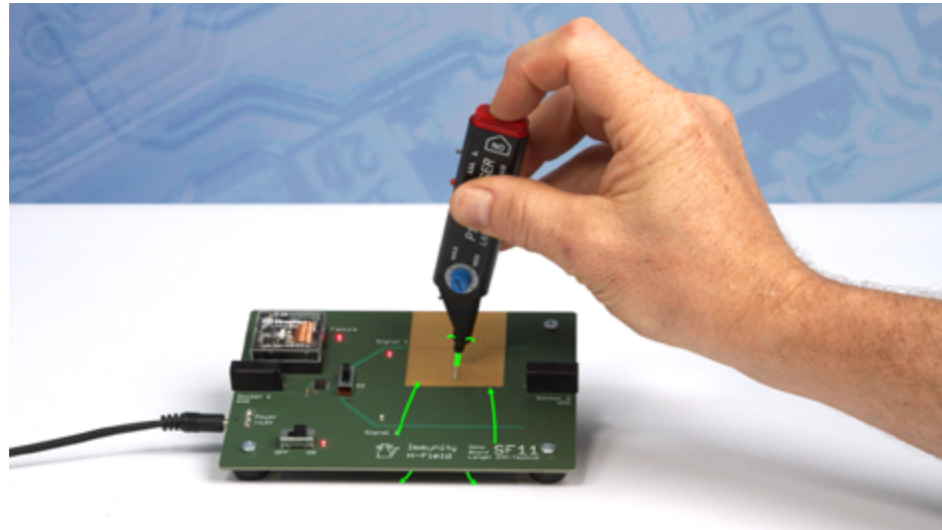


Figure 3: Interference control with Pulser P11

In the case of the SF 11 demo board, a gap in the GND surface deliberately allows magnet field to pass through the module between the signal line1 and GND. A functional error occurs - the relay rattles. The path of the magnetic field lines is shown in Figure 3. (If this test does not lead to a functional error, the polarity must be changed at the pulser).

The coupling can be prevented by a „shield“ made of adhesive copper tape: the magnetic field is blocked by the eddy currents within the adhesive copper tape. The magnetic field can no longer penetrate the assembly, and the SF 11 is immune to interference.

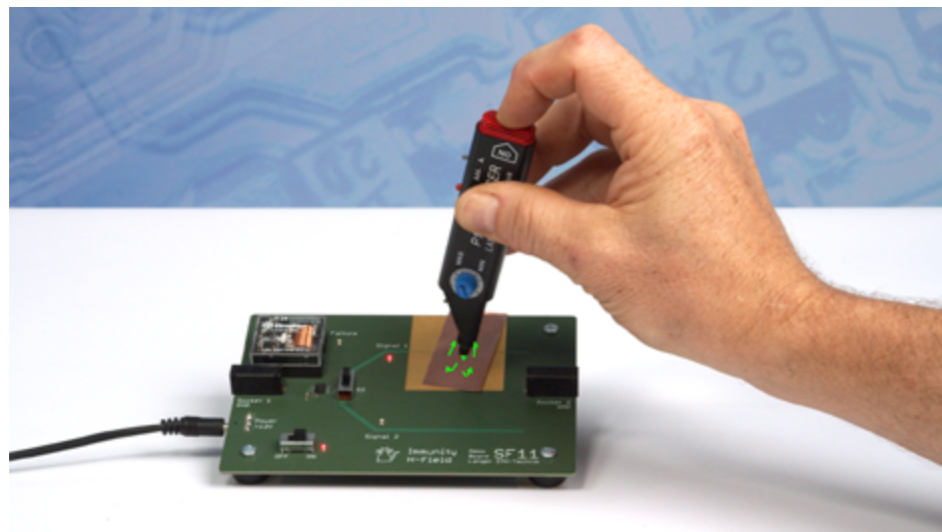


Figure 4: Improving the immunity with a piece of adhesive copper tape

Alternatively, the line „Signal2“ can be activated by switching the switch S2. This line is completely surrounded by GND and deposited in the inner layer with GND. Almost no magnetic field can reach around the signal line, the assembly is much more resistant to interference (Fig. 5).

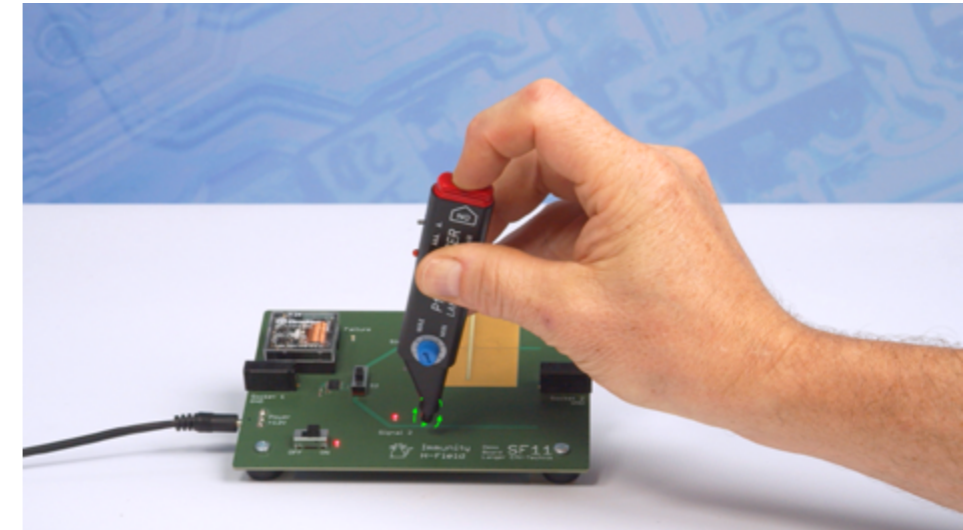


Figure 5: Coupling near line signal2

5.2 SF 21 - Demo Board E-Field Immunity

If only one single cable is connected to an assembly, the result is a field image as shown in Fig. 6.

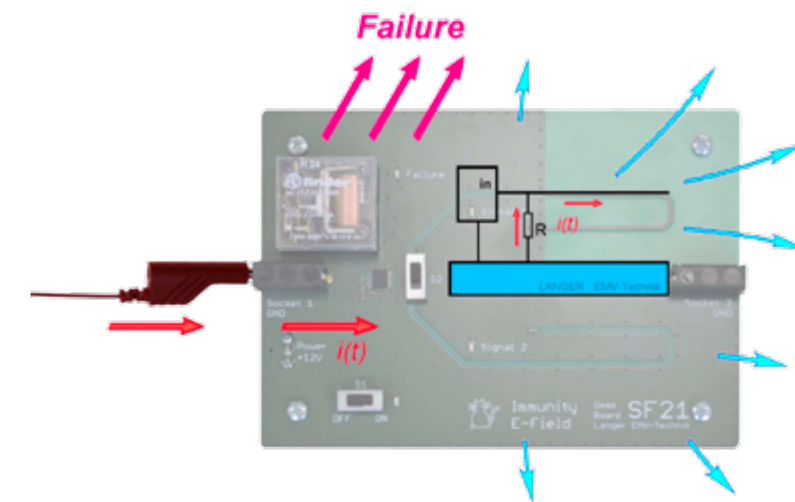


Figure 6: Field image of SF 21 - only one cable connected

The interference current flows into the module, but couples out again capacitively as an electric field (electric flux). This decoupling is done from the GND area as well as from all connected components and lines. The current decoupling from the signal line in Fig. 6 generates a voltage difference at resistor „R“ (This resistor symbolizes the output resistance of an IC output.). This voltage difference can lead to the functional error.

The described electric fields can be generated locally with the P21 pulser. If it is guided over the module near line „Signal1“ as shown in Fig. 7, electric field couples directly into the signal line. A functional error occurs - the relay rattles.

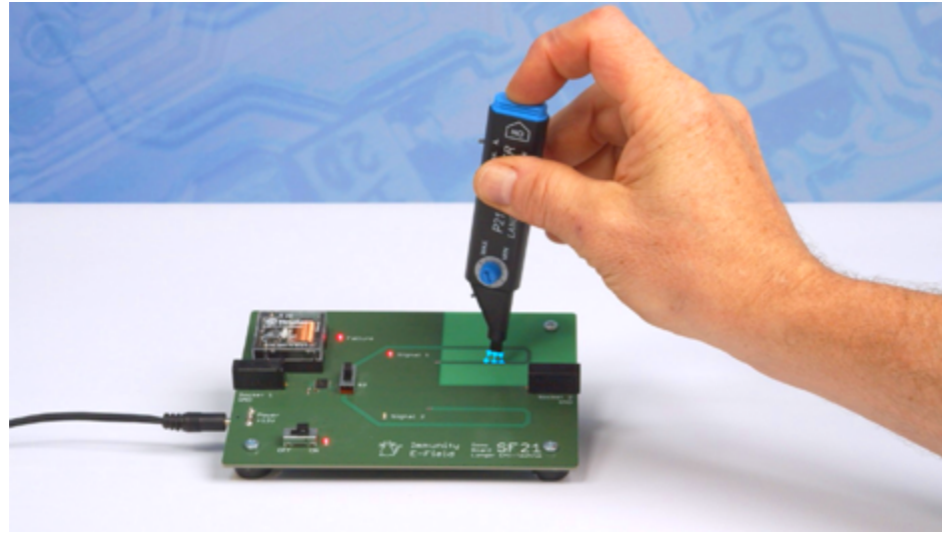


Figure 7: Coupling of electric field into signal1

If the P21 pulser is moved across the board in the vicinity of line „Signal2“, the interference is much less, since a large part of the electric field does not couple into the signal line, but into the GND surface in the immediate vicinity (Fig. 8).

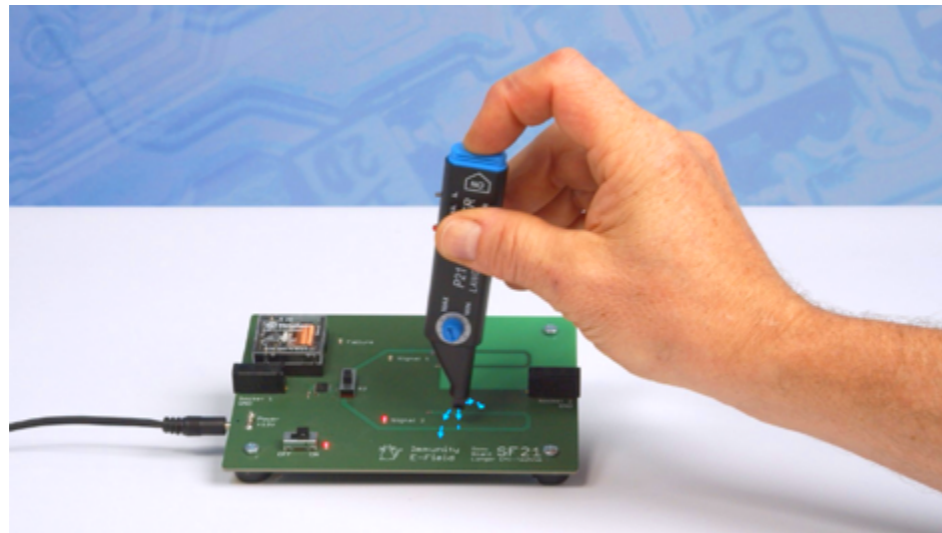


Figure 8: Coupling of electric field near signal2

6. Information on Recycling and Disposal



According to the WEEE Directive 2012/19/EU (Waste of Electrical and Electronic Equipment), the following must be observed:

At the end of its service life, this product should be taken to a suitable disposal facility for recycling and disposal. Do not dispose of with household waste.

7. Customer Service

Please contact us if you have any queries, hints and suggestions.

Contact us at:

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Email: sales@langer-emv.de
Internet: www.langer-emv.com

8. Warranty

Langer EMV-Technik GmbH will remedy any fault due to defective material or defective manufacture during the statutory warranty period either by repair or by delivery of spare parts.

This warranty is only granted on condition that:

- The information and instructions in the user manual have been observed.

The warranty will be forfeited if:

- An unauthorized repair is performed on the product.
- The product is modified.
- The product is not used for its intended purpose.
- The product is opened.

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